

## REMARKS/ARGUMENTS

Applicants request that the examiner consider the following remarks upon further review of the instant application. Applicants further request, as explained below, that the examiner again review the remarks made in the *Third Amendment and Response to the Final Office Action* filed 1 March 2004 while considering the patentability of the claims presented herein.

### Claim Amendments

Claims 20-27 are new claims.

Independent claim 20 corresponds in scope to claim 1.

Claims 21-23 are directed toward clarifying the “addressability” of the quantum dots in the claimed device. Support for claims 21-23 can be found, for example, in paragraph 47 of the specification.

Claims 24 and 25 are directed toward clarifying the fact that the energy “addressed” to the quantum dots can be varied and thus result in different effects in the claimed device. Support for claims 24 and 25 can be found, for example, in paragraph 50 of the specification.

Independent claim 26 corresponds in scope to claim 7.

New claim 27 is directed toward a novel structure disclosed in the application.

### Claim Rejections for Indefiniteness – 35 U.S.C. § 112

The advisory action states that the rejections in the final action pursuant to 35 U.S.C. § 112 remain valid with respect to the current claim language. Applicants disagree and reassert the remarks filed in the *Third Amendment and Response to the Final Office Action* filed 1 March 2004. Applicants believe the final Office action misapplies the law governing claim requirements under 35 U.S.C. § 112, ¶ 2, and fails to meet the burden placed on the Office for making a rejection based upon this legal requirement.

An interview with Examiners Healy and Petkovsek was conducted by Applicants’ representative on 21 April 2004. Independent claims 1 and 7 in particular were the subject of the interview discussion. In its summary of the interview, the examiners state as their rationale for the rejection under § 112, ¶ 2, that “the claims include desired results (i.e., thus forming artificial atoms whose size, shape, atomic number, and energy level are dependent upon the energies in said control paths) without sufficient structural limitations in the claims to successfully accomplish these results.” While this statement is similar in its terminology to statements made

in the final action, Applicants believe this statement to be a much clearer indication of the basis of the examiners' concerns than as expressed in the final action. Accordingly, Applicants focus the following remarks to address the concerns addressed by the examiners in the interview.

Applicants assert that the results recited in the claims do in fact follow from the structure set forth in claims. While the examiners may not believe that these results occur or understand why they occur, such disbelief or lack of understanding does not mean that the results do not follow from the claimed structures. In order to aid in the understanding of the examiners, Applicants submit herewith the Declaration of Robert A. Metzger, Ph.D. Dr. Metzger was asked to independently review the instant application and the claimed invention for technical soundness. Dr. Metzger states, "The physics of altering the electrical, optical, and chemical behavior of quantum dots by electrical or photonic stimulation is understandable, as well as the methods [the applicants] propose-including the use of a conductive path within a fiber material to alter the properties of the quantum dots." ¶ 5. Dr. Metzger further states that "McCarthy and Snyder's claim that quantum dots incorporated in a fiber, or incorporated throughout a material, could alter the electrical, optical, and chemical behavior of that material is true." ¶ 4. Dr. Metzger's comments, therefore, clearly support the conclusion that the structures as claimed do combine to achieve the described result.

The nature of quantum dots and the formation of artificial atoms therein has been previously described in the art. (See, e.g., Turton (1995) and Kouwenhoven et al. (1998) previously disclosed to the Office by Applicants.) A quantum dot is a structure that traps charge carriers within a confinement region on an atomic scale. While such charge carriers are confined, they exhibit atom-like properties and have thus been termed "artificial atoms." For example, Futatsugi (U.S. Patent No. 5,889,288) describes one exemplary method for varying the number of electrons trapped in a quantum dot. As a particularized expression of a quantum dot is not the point of the invention, a detailed description of the structure of a quantum dot should not be required in the claims.

Dr. Metzger recognizes the invention of the present application as "a new structure and methodology, wherein the electron structure of the quantum dot is actively manipulated through various means (such as wires to make electrical or photonic contact), ...[providing] the ability to selectively tune the quantum dots over a wide range of electronic configurations, in essence creating an artificial atom with desired electronic configurations." ¶ 5. What the prior art does

not appreciate or suggest, which is a primary feature of the claimed invention, is the placement a plurality of quantum dots within a material and, either individually, in groups, or en masse, the application and variance of energy to the quantum dots. As Dr. Metzger points out, this application of energy will necessarily change the energy or structure of the artificial atoms created within the quantum dots. See ¶ 5. Because the quantum dots are distributed within the material, certain properties of the material will be altered as the quantum dots act to dope the material. By changing the energy applied to the quantum dots, the doping effect of the quantum dots within the material also changes to cause different effects on the material properties.

Applicants remind the examiners that “If the claims, read in light of the specification, reasonably apprise those skilled in the art both of the utilization and scope of the invention, and if the language is as precise as the subject matter permits, the statute (35 U.S.C. 112, Second paragraph) demands no more. *Shatterproof Glass Corp. v. Liberty Owens Ford Co.*, 758 F.2d 613, 225 USPQ 634 (Fed. Cir 1985).” M.P.E.P. § 2173.05(a). Applicants submit that they have met this burden.

Notwithstanding Applicants’ position regarding the impropriety of the claim rejections, Applicants present new independent claims 20-27 in an effort to recite the structure of the invention in a form acceptable to the examiners. Applicants welcome any further suggestions the examiners may have regarding acceptable language for appropriately claiming the invention.

Conclusion

For the reasons set forth above, Applicants respectfully request that a timely Notice of Allowance be issued in this case.

Respectfully submitted this 17<sup>th</sup> day of June 2004.



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